

UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. L9465

UTR NO. 9

OVER THE

EAST FORK OF THE RAPID RIVER

DISTRICT 1 - KOOCHICHING COUNTY



PREPARED FOR THE
MINNESOTA DEPARTMENT OF TRANSPORTATION
BY
COLLINS ENGINEERS, INC.
JOB NO. 3512 (CEI 21)

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure units inspected below water at Bridge No. L9465, Piers 1 through 4, were found generally to be in good condition below water. The weathering and 1/8 to 1 inch wide random checking and/or splitting observed on all timber piles has progressed since the previous inspection, but still has not appreciably compromised the structural integrity of the piles. A moderate to heavy accumulation of timber debris was observed along Piers 1 through 4, and in the channel between the piers. Since the previous inspection the timber debris extent has increased and has caused a restriction of the channel, which has in turn caused increased flow and erosion at the west bank. Otherwise, the channel bottom has remained mostly stable with no evidence of significant scour observed or significant changes since the last inspection.

INSPECTION FINDINGS:

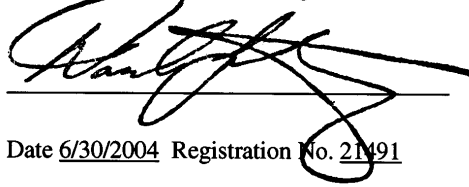
- (A) A moderate to heavy accumulation of timber debris was observed along Piers 1 through 4, and in the channel upstream of the piers extending 100 feet upstream. The debris has restricted the channel flow, causing increased flow and an erosion pocket to form along the west bank.
- (B) In general, the minor deterioration observed on all timber piles consisted of widespread weathering and 1/8 to 1/4 inch wide checking.
- (C) Above water, especially near their tops, random piles exhibited more significant checking and splitting up to 1 inch wide with a maximum penetration of half the pile diameter.
- (D) The crossbracing at the upstream end of Pier 3 was damaged and had no connection to the upstream pile.

RECOMMENDATIONS:

- (A) Remove the moderate to heavy accumulation of timber debris at Piers 1 through 4 and between the spans to eliminate the potential for continued accumulation, scour influence, and excessive lateral loads on bridge.
- (B) Repair the damaged crossbrace and connection at upstream pile of Pier 3.
- (C) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years.

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Daniel G. Stromberg



Date 6/30/2004 Registration No. 21491

Respectfully submitted,

COLLINS ENGINEERS, INC.



Daniel G. Stromberg
Registered Professional
Engineer, State of Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

1. BRIDGE DATA

Bridge Number: L9465

Feature Crossed: The East Fork of the Rapid River

Feature Carried: UTR NO. 9

Location: District 1 - Koochiching County

Bridge Description: The bridge superstructure consists of five spans of timber deck and stringers. The superstructure is supported by two timber pile abutments and four timber pile piers. The piers are numbered 1 through 4 started from the east end of the bridge.

2. INSPECTION DATA

Professional Engineer Diver: Daniel G. Stromberg
State of Minnesota, P.E., No. 21491

Dive Team: Michelle D. Koerbel, Matthew J. Lengyel

Date: August 25, 2002

Weather Conditions: Sunny, $\pm 65^{\circ}$ F

Underwater Visibility: ± 1.5 Feet

Waterway Velocity: ± 0.5 fps

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Piers 1 through 4.

General Shape: Each pier consists of a single row of five timber piles under a common pile cap and interconnected by timber cross bracing.

Maximum Water Depth at Substructure Inspected: Approximately 4.75 feet.

4. WATERLINE DATUM

Water Level Reference: The top of the pile cap at downstream end of Pier 3.

Water Surface: The waterline was approximately 11.7 feet below reference.
Waterline Elevation = 91.5.

5. NBIS CODING INFORMATION (Minnesota specific codes are used for 92B and 113)

Item 60: Substructure: Code 7

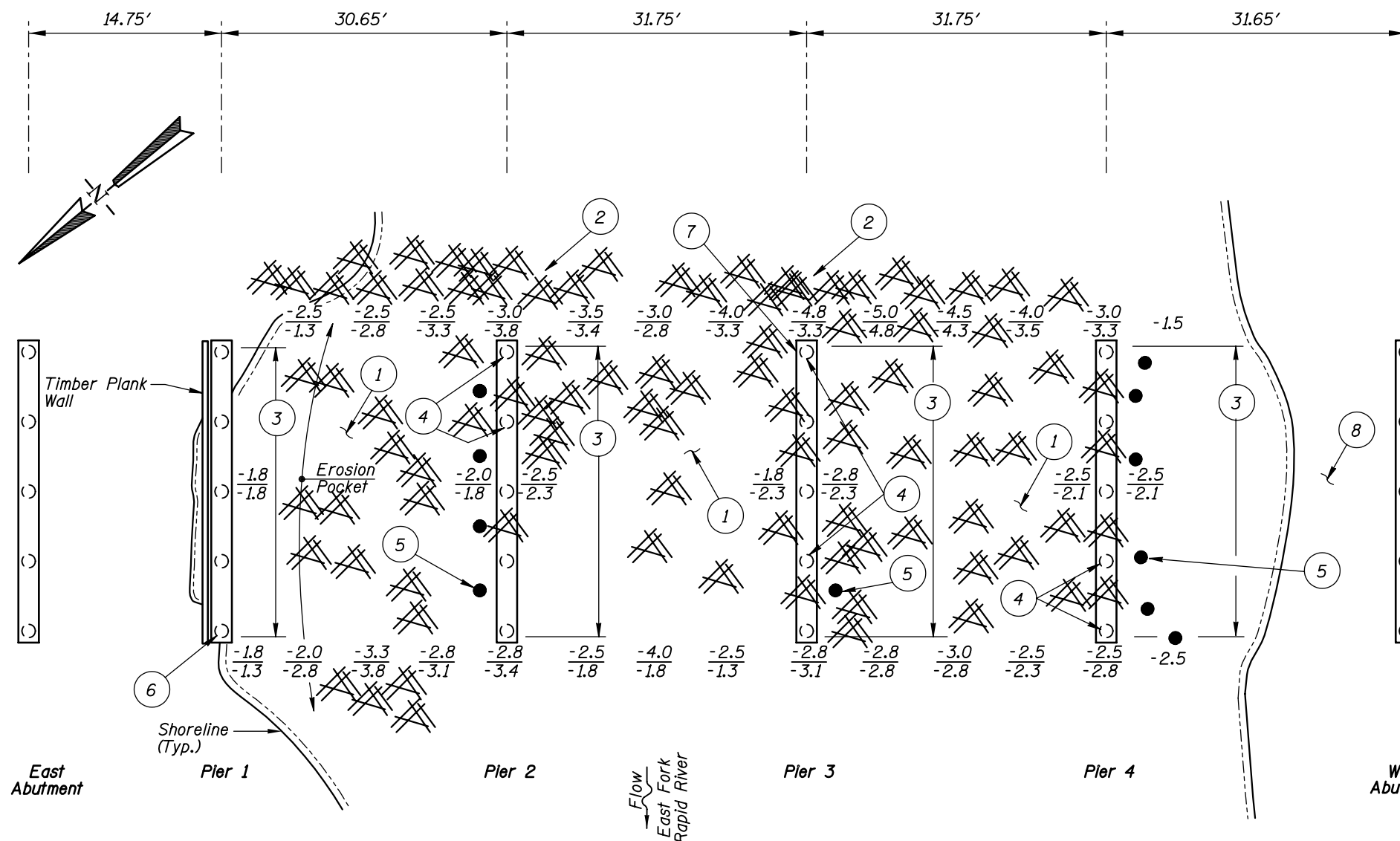
Item 61: Channel and Channel Protection: Code 5

Item 92B: Underwater Inspection: Code B/08/02

Item 113: Scour Critical Bridges: Code K/95

Bridge is scour critical because abutment or pier foundation is rated as unstable due to observed scour at bridge site.

_____ Yes X No



GENERAL NOTES:

- Piers 1 through 4 were inspected at this bridge.
- At the time of inspection on August 20, 2002, the waterline was located approximately 11.7 feet below the top of pier cap at downstream end of Pier 3. This corresponds to a waterline elevation of 91.5 feet based on previous report dated 8/20/97.
- Soundings indicate the water depth at the time of inspection and are measured in feet.
- Soundings were taken parallel to the bridge at 1/4 point intervals between the substructure units.

INSPECTION NOTES:

- The channel bottom consisted of approximately 1 foot of soft organic material and twigs overlaying a firm silty clay with probe rod penetrations of 3 inches.
- Moderate to heavy accumulation of timber debris was observed along and between Piers 1 through 4, and in the channel upstream of the piers extending 100 feet upstream. The debris has restricted the channel flow causing increased flow and erosion pocket to form in the channel to the west of Pier 1.
- Minor deterioration was randomly observed on all timber piles consisting of weathering and 1/8 to 1/4 inch wide checking.
- Above water, especially near their tops, indicated piles exhibited heavier checking and splitting from 1/2 to 1 inch wide with a maximum penetration of half the pile diameter.
- Piles cut off above the waterline were observed typically extending 1 foot above the waterline with some extending up to the pile cap.
- Moderate deterioration along a 2 inch wide strip from mudline to 2 feet above waterline, with 1/2 inch penetration and another 1 inch of soft wood.
- The cross bracing was damaged and no longer connected to the upstream pile of Pier 3.
- Erosion of shoreline was observed along the west shoreline. However, the shoreline armour consisted of 3 feet diameter riprap was still in place along the shoreline.

Legend

- 3.0 Sounding Depth from Waterline (8/24/02)
- 2.8 Sounding Depth from Waterline (8/20/97)
- () Timber Pile
- Old Cut-off Pile Left In Place
- Timber Debris

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION

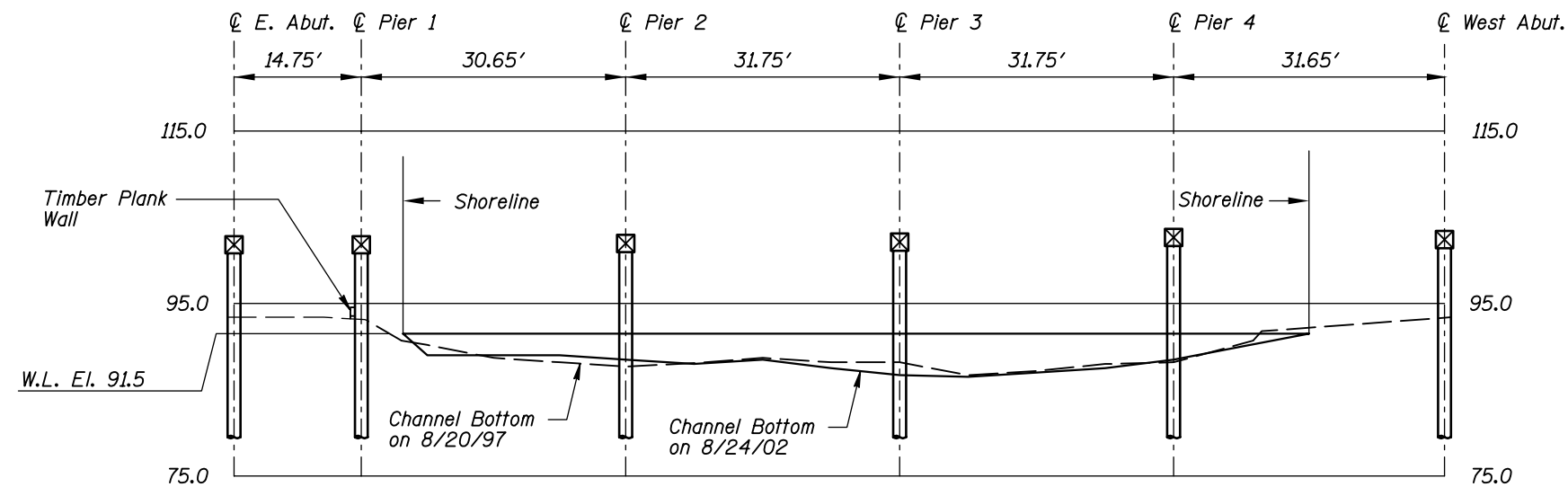
STRUCTURE NO. L9465
OVER THE EAST FORK OF THE RAPID RIVER
DISTRICT 1, KOOCHICHING COUNTY

INSPECTION AND SOUNDING PLAN

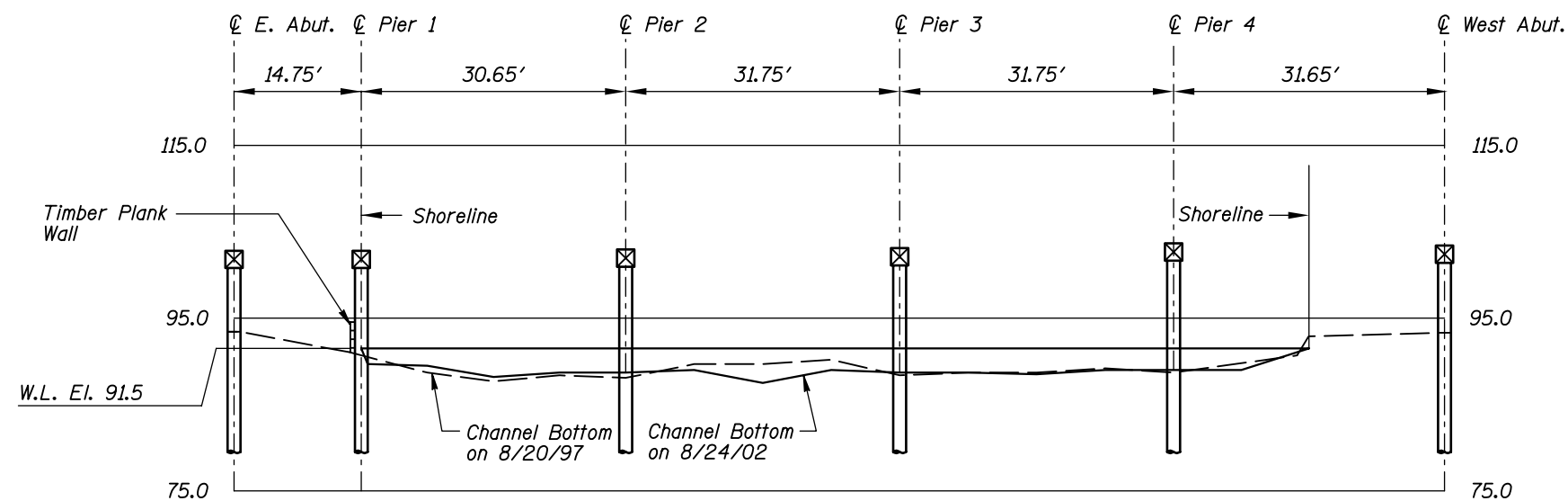
Drawn By: PRH
Checked By: MDK
Code: 35120021

COLLINS ENGINEERS, INC.
300 W. WASHINGTON, STE. 600
CHICAGO, ILLINOIS 60606
(312) 704-9300

Date: AUG. 2002
Scale: NTS
Figure No.: 1



UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE

Note:
Refer to Figure 1 for General Notes.

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION		
STRUCTURE NO. L9465 OVER THE EAST FORK OF THE RAPID RIVER DISTRICT 1, KOOCHICHING COUNTY		
UPSTREAM AND DOWNSTREAM FASCIA PROFILES		
Drawn By: PRH	COLLINS ENGINEERS, INC.  300 W. WASHINGTON, STE. 600 CHICAGO, ILLINOIS 60606 (312) 704-9300	Date: AUG. 2002
Checked By: MDK		Scale: 1"=20'
Code: 35I2002I		Figure No.: 2



Photograph 1. Overall View of Bridge, Looking Southeast.



Photograph 2. View of Pier 1, Looking North.



Photograph 3. View of Pier 2, Looking East.



Photograph 4. View of Pier 3, Looking Southeast.



Photograph 5. View of Pier 4, Looking Southeast.



Photograph 6. View of Timber Debris Between Piers 1 and 2, Looking Southwest.



Photograph 7. View of Timber Debris at Pier 3, Looking North.



Photograph 8. View of Timber Debris Between Piers 3 and 4, Looking North.



Photograph 9. View of Typical Larger Splitting/Checking at Top of Piles, Looking Southwest.



Photograph 10. View of 1" Wide Split at the Top of the Center Pile of Pier 4, Looking North.



Photograph 11. View of Damaged Crossbrace and Connection at Upstream Pile of Pier 3.

INSPECTORS: Collins Engineers, Inc. DATE: August 25, 2002

ON-SITE TEAM LEADER: Daniel G. Stromberg, P.E.

BRIDGE NO: L9465 WEATHER: Sunny, $\pm 65^{\circ}$ F

WATERWAY CROSSED: The East Fork of the Rapid River

DIVING OPERATION: X SCUBA SURFACE SUPPLIED AIR
X OTHER Wading also due to low water levels

PERSONNEL: Michelle D. Koerbel, Matthew J. Lengyel

EQUIPMENT: Scuba, Scraper, Lead Line, Sounding Pole, Probe Rod, Camera

TIME IN WATER: 9:15 A.M.

TIME OUT OF WATER: 9:54 A.M.

WATERWAY DATA: VELOCITY ± 0.5 fps
VISIBILITY ± 1.5 feet
DEPTH 4.75 feet maximum at Pier 3

REMARKS: Timber piles and bracing of Piers 1 through 4 were in good condition with no defects of any structural significance below water. In general, the timber deterioration observed consisted of weathering and 1/8 inch to 1/4 inch wide checking. Above water especially near tops, the pile checking or splitting was up to 1 inch wide with penetration of up to 1/2 the pile diameter. The crossbracing at the upstream end of Pier 3 was damaged and had no connection to the upstream pile. A moderate to heavy accumulation of timber debris was present on the upstream side of Piers 1 through 4. The accumulations of timber debris were present from the channel bottom to the waterline around all of the piers and between the spans. There was an erosion pocket to the west of Pier 1 caused by flow being directed there by the drift restricting flow through the bridge.

FURTHER ACTION NEEDED: X YES NO

Remove the moderate to heavy accumulation of timber debris at Piers 1 through 4 and between the spans, to eliminate the potential for continued accumulation, scour influence, and excessive lateral loads on bridge. Repair damaged brace connection to upstream pile at Pier 3.

Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years.

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. L9465
INSPECTORS Collins Engineers, Inc.
ON-SITE TEAM LEADER Daniel G. Stromberg, P.E. 21491
WATERWAY CROSSED The East Fork of the Rapid River

INSPECTION DATE August 25, 2002
NOTE: USE ALL APPLICABLE CONDITION
DEFINITIONS AS DEFINED IN THE MINNESOTA
RECORDING AND CODING GUIDE INCLUDING
GENERAL, SUBSTRUCTURE, CHANNEL AND
PROTECTION, AND CULVERTS AND WALL
DEFINITIONS TO COMPLETE THIS FORM.

CONDITION RATING

UNIT REFERENCE NO.	UNIT DESCRIPTION	MAXIMUM DEPTH OF WATER	SUBSTRUCTURE						CHANNEL					GENERAL					
			PILING	COLUMNS, SHAFTS, OR FACES*	FOOTINGS	DISPLACEMENT	OTHER (BRACING)	OVERALL SUBSTRUCTURE CONDITION CODE*	SCOUR	EMBANKMENT EROSION	EMBANKMENT PROTECTION	OTHER (DRIFT/DEBRIS)	OVERALL CHANNEL & PROTECTION CONDITION	CONCRETE	STEEL	TIMBER	LOSS OF SECTION	PREVIOUS REPAIR OR MAINTENANCE	OTHER
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Pier 1	1.75'	7	7	N	9	7	7	6	N	N	5	5	N	N	7	8	N	N
	Pier 2	3.0'	7	7	N	9	7	7	8	N	N	5	5	N	N	7	8	N	N
	Pier 3	4.75'	7	7	N	9	6	7	8	N	N	5	5	N	N	7	8	N	N
	Pier 4	3.0'	7	7	N	9	7	7	8	N	8	5	5	N	N	7	8	N	N

*UNDERWATER PORTION ONLY

REMARKS: Timber piles and bracing of Piers 1 through 4 were in good condition with no defects of any structural significance below water. In general, the timber deterioration observed consisted of weathering and 1/8 inch to 1/4 inch wide checking. Above water especially near tops, the pile checking or splitting was up to 1 inch wide with penetration of up to 1/2 the pile diameter. The crossbracing at the upstream end of Pier 3 was damaged and had no connection to the upstream pile. A moderate to heavy accumulation of timber debris was present on the upstream side of Piers 1 through 4. The accumulations of timber debris were present from the channel bottom to the waterline around all of the piers and between the spans. There was an erosion pocket to the west of Pier 1 caused by flow being directed there by the drift restricting flow through the bridge.

NOTES: ATTACH SKETCHES AS NEEDED, IDENTIFY REMARK BY REFERRING TO UNIT REFERENCE NO. AND REMARK NO.
USE GENERAL SECTION TO IDENTIFY OVERALL PRESENCE OF SPALLS, CRACKS, CORROSION, ETC.